Solve each of the following:

$9-4(2x+3)+3x=27$

$9-8x-12+3x=27$

$-5x-3=27$

$+3\quad+3$

$-5x=30$

$\boxed{x=-6}$

$-2|x-4|\le -10$

$\div -2 \quad \div -2$

$|x-4|\ge 5$

$x-4=0$

$x=4$

$-1\quad 4\quad 9$

$(-\infty,-1]\cup[9,\infty)$

Nov 4-11:48 AM

Algebra 2 5.0 Name: ________________

Transformations Notes Date: ____________ Pd: ___

TRANSFORMATIONS

Today we are going to use a function that you have learned a lot about recently. The general form for an absolute value equation is

$$f(x)=a|x-h|+k$$

Think back to the activity you did in class yesterday…Remember how the graph moved when we changed the function $f(x)=|x|$??

VERTICAL SHIFT: "K" Value

The first two graphs you created yesterday were the graphs of
$f(x)=|x|+4$ and $f(x)=|x|-4$
$k=4$ $k=-4$

How did those graphs differ from the original absolute value graph?
____

Conclusion:

The "**k**" value in the equation represents the VERTICAL SHIFT.

The graph shifts **UP** when the "k" value of $f(x)=a|x-h|+k$ is Positive.

The graph shifts **DOWN** when the "k" value of $f(x)=a|x-h|+k$ is Negative.

HORIZONTAL SHIFT: "h" Value

The ~~third~~ and fourth graphs you created yesterday were the graphs of
$f(x)=|x-3|$ and $f(x)=|x+3|$

$x-3=0$, $x=3$, $\boxed{h=3}$ $\rightarrow$

$\leftarrow$ $h=-3$; $x+3=0$, $-3\ -3$, $x=-3$

How did those graphs differ from the original absolute value graph?
____

Conclusion:

The "**h**" value in the equation represents the HORIZONTAL SHIFT.

The graph shifts **LEFT** when the "h" value of $f(x)=a|x-h|+k$ is Negative.

The graph shifts **RIGHT** when the "h" value of $f(x)=a|x-h|+k$ is Positive.

*** Remember the original equation is $f(x)=a|x-h|+k$ ***
(where h is being subtracted).
Therefore if the equation reads $x-h$, h is positive and if the equation reads $x+h$, h is negative!

$f(x)=|x+5|+2$
$h=-5$ $\leftarrow$ $\uparrow k=2$

$f(x)=|x-7|$
$h=7$ $\rightarrow$

Nov 4-12:16 PM

REFLECTION OVER X-AXIS: "a" is negative

The fifth graph you created yesterday was the graph of
$f(x)=-|x|$

How did this graph differ from the original absolute value graph?
Reflected over the x-axis.

Conclusion:

One of the things the "**a**" value affects is the direction the graph opens.

The graph opens up when the "a" value is Positive.

The graph opens down when the "a" value is Negative.

☺ We only consider it a transformation when the "a" value is negative and say the graph is Reflected over the x-axis.

VERTICAL STRETCH and COMPRESSION:

The sixth and seventh graphs you created yesterday were the graphs of
$f(x)=2|x|$ Narrower and $f(x)=\frac{1}{2}|x|$ Wider
Vertical Stretch   Vertical Compression

How did these graphs differ from the original absolute value graph?
____

Conclusion:

The other change in the graph the "**a**" value affects is a vertical stretch or compression .

The graph is VERTICALLY STRETCHED when the "a" value is
greater than 1.

The graph is VERTICALLY COMPRESSED when the "a" value is
Between 0 and 1

☺ We say the graph is vertically stretched or compressed by a factor of ____. (the a value)

Examples:

Identify each transformation from the parent function to the given f(x).

Transformation

1. $f(x)=|x|-5$ Vertical shift down 5 units.
$k=-5$

2. $f(x)=|x+6|$ Shifted 6 units to the Left.
$h=-6$

3. $f(x)=4|x|$ Vertically Stretched by a Factor of 4.
$a=4$

4. $f(x)=-|x-3|+7$ Reflection over the x-axis, Shifted 3 units to the right, then 7 units up.
$h=3$ $k=7$

5. $f(x)=\frac{1}{3}|x+3|+8$ Vertically Compressed by a factor of $\frac{1}{3}$ Shifted 3 units to the Left, and 8 units up.
$h=-3$ $k=8$

Write the function for each graph described below.

6. the graph of $f(x)=|x|$ translated 9 units to the right. $f(x)=|x-9|$
$h=9$

7. the graph of $f(x)=|x|$ vertically compressed by a factor of $\frac{1}{5}$. $f(x)=\frac{1}{5}|x|$
$a=\frac{1}{5}$

8. the graph of $f(x)=|x|$ vertically stretched by a factor of 8 and translated 3 units down. $f(x)=8|x|-3$
$a=8$ $k=-3$

9. the graph of $f(x)=|x|$ reflected over the x-axis and translated 1 unit to the right. $f(x)=-|x-1|$
$a=-1$ $h=1$

10. the graph of $f(x)=|x|$ translated 25 units down, 19 units to the left, vertically stretched by a factor of 3 and reflected over the x-axis.
$h=-19$
$f(x)=-3|x+19|-25$

Algebra 2 5.0
Transformations HW (#1)

Name: ____________
Date: ________ Pd: ____

Identify each transformation from the parent function $f(x)=|x|$ to the given f(x).

Transformation(s)

1. $f(x)=|x|-5$ shifts down 5 units
2. $f(x)=|x+6|$ shifts 6 units left
3. $f(x)=4|x|$ vertically stretched by a factor of 4
4. $f(x)=|x-3|-5$ shifted 3 units right shifted 5 units down
5. $f(x)=\frac{1}{2}|x+2|$ vertically compressed by a factor of ½; shift 2 units left
6. $f(x)=-|x-1|$ reflected over "x" axis; shift 1 unit right
7. $f(x)=\frac{1}{12}|x+4|-7$ vertically compressed by a factor of 1/12; shift 4 units left; shift down 7 units
8. $f(x)=-2|x+3|+9$ reflection over "x" axis; vertical stretch by a factor of 2; shift 3 units Left; shift 9 units UP.
9. $f(x)=3|x+4|-7$ vertically stretched by a factor of 3; shift 4 units LEFT; shift 7 units down
10. $f(x)=-\frac{1}{2}|x-6|-17$ reflection over "x" axis; vertical compression by a factor of ½; shift 6 units Right; shift 17 units down

a h k

Write the function for each graph described below.

11. the graph of $f(x)=|x|$ translated 12 units to the right. $f(x)=|x-12|$
12. the graph of $f(x)=|x|$ vertically compressed by a factor of $\frac{1}{5}$. $f(x)=\frac{1}{5}|x|$
13. the graph of $f(x)=|x|$ vertically stretched by a factor of 4. $f(x)=4|x|$
14. the graph of $f(x)=|x|$ vertically stretched by a factor of 2 and translated 6 unit to the right. $f(x)=2|x-6|$
15. the graph of $f(x)=|x|$ translated 22 units down and translated 13 units to the left. $f(x)=|x+13|-22$
16. the graph of $f(x)=|x|$ translated 14 units up, vertically stretched by a factor of 12, and reflected over the x-axis. $f(x)=-12|x|-14$
17. the graph of $f(x)=|x|$ vertically compressed by a factor of $\frac{1}{3}$, translated 28 units to the left, and reflected over the x-axis. $f(x)=-\frac{1}{3}|x+28|$

HW

Transformations Wksht #2

BOTH SIDES

Nov 4-1:03 PM